

**COUNTY OF LOS ANGELES - DEPARTMENT OF HEALTH SERVICES
PUBLIC HEALTH - DISEASE CONTROL PROGRAMS**

VETERINARY PUBLIC HEALTH AND RABIES CONTROL

Analysis of the Epidemic Begins

The British epidemic is on the verge of becoming the biggest in the world. The number of confirmed FMD cases passed 1,600 Monday. Adding the various costs (millions of animals killed, export restrictions and loss of tourists), FMD may exceed Great Britain's cost of bovine spongiform encephalopathy (BSE) or mad cow disease. Great Britain destroyed nearly five million farm animals in its efforts to control mad cow disease. BSE prions spread into people causing a variant form of Creutzfeldt-Jakob disease (vCJD). Kuru, the deadly disease spread by eating human brains and closely linked to BSE and vCJD, has an average incubation time of 12 years. Some victims incubate Kuru for 30 years.

The latest figures show 99 cases of vCJD. However, a report in the *Proceedings of the National Academy of Sciences* warned that the predicted size of the vCJD epidemic may have been underestimated. Research in mice suggests that only people with the shortest incubation periods for the disease are showing symptoms of the human form of BSE. Patients with vCJD may be those genetically disposed to have the shortest incubation periods. If this is true, the epidemic of vCJD may stretch out for decades. It could mean that huge numbers of people who ate infected meat in the late 1980s are infected with the fatal disease, but have yet to develop it. Some scientists have suggested that up to 250,000 people could become victims.

The foot-and-mouth outbreak all but paralyzed the countryside. Agriculture officials placed tight restrictions on the transport of animals and initially discouraged people from visiting rural areas, for fear they might spread the virus. Since foot-and-mouth was officially confirmed in England on February 20, animals on more than 1,500 farms were thought to be afflicted by the disease. This mass killing of livestock fueled anger in the British farming community, which has lost nearly four percent of its livestock.

Television images of slaughtered animals and smoking pyres scared many foreign tourists off costing the United Kingdom billions of dollars. Some domestic travelers have also avoided rural areas, where many country footpaths are still closed.

To stop the FMD outbreak, the government's goal was to kill livestock within 24 hours on those farms where the disease was confirmed. Farms suspected of having the virus were quarantined. Livestock on neighboring farms were to be killed within two days. Some debate whether this goal was ever met. Recently, the number of new cases confirmed each day has been in single digits, compared to a peak of more than 40 per day earlier this year.

Nearly three million animals were slaughtered in less than three months to contain the outbreak (Figure 1). A staggering rate of destruction. Great Britain expects to spend \$820 million to compensate farmers for slaughtered animals.

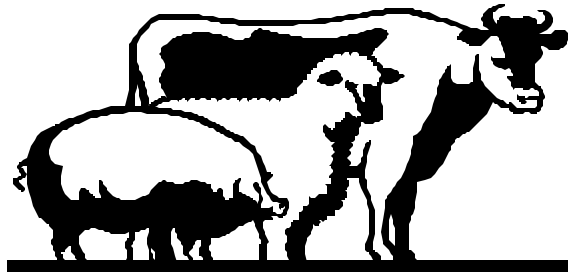


Figure 1 In attempting to stop the foot-and-mouth disease epidemic in Europe, the three main livestock destroyed were sheep, cattle and swine. Of over 2.6 million livestock killed, sheep represented 79%, cattle 17% and swine 4%. Source *Maff* 5/12/01

Cattle Costly

Economically, the most valuable livestock lost in the FMD epidemic in the United Kingdom were cattle. California has roughly three million cattle. The animals are kept in close quarters on crowded feedlots and mammoth dairies allowing for the rapid spread of infectious diseases. Herds are typically hemmed in by urban sprawl. Dairy cattle are the most expensive and represent about half of California's cattle. The State has more dairy cattle than any other state. Dairy production is the leading agricultural enterprise in California, producing about 18% of the nation's milk. California officials estimate a large outbreak of foot-and-mouth disease could cause more than \$13.5 billion in damage to California's livestock. The National Guard would likely be called out.

***Nature* Reports Outbreak Under Control**

On May 11, a team of independent scientists agreed that the livestock disease that crippled the British tourism industry, sapped national morale and turned Britain's bucolic countryside into an enormous slaughterhouse, was under control. The study published in the journal *Nature*, said the government's battle against foot-and-mouth disease was being won. In the beginning of the epidemic, it was determined that each new case of FMD led to three new cases elsewhere. An epidemic can be considered under control if the number is less than one, and this which was achieved by March 30. Nonetheless, the study reported, "Any intensification or relaxation of control efforts could greatly affect the final scale and duration of the epidemic."

Livestock Unjustly Killed Angers Farmers

The Ministry of Agriculture admitted that hundreds of farms where animals were culled for foot-and-mouth may not have had the disease at all. An internationally renowned laboratory where the animals were tested for foot-and-mouth said 30% of the herds confirmed as infected showed no sign of the disease. This has reduced public credibility in the program. Nearly one out of three foot-and-mouth cases suspected by veterinarians was not confirmed by laboratory tests. The admission has raised the possibility that herds at hundreds of farms were wrongly diagnosed, leading to the unnecessary slaughter of thousands of animals. In one situation where 250 animals were slaughtered on suspicion of having FMD, only 46 cases (18.4 percent) were confirmed positive by laboratory tests. Dr. Andrew Scott, of the British Veterinary Association, said one problem was that most veterinarians had not seen a case of foot-and-mouth disease before.

Such mistakes cost the taxpayer millions of dollars in compensation. Farmers fumed after the announcement. Some farmers were angry they were denied the right to protect their livestock by vaccination. Farmers may now resist foot-and-mouth culls after the government admitted that hundreds of slaughtered animals may not have had the disease at all.

The Ministry of Agriculture response to the negative tests is they were required to act quickly to contain the disease. Veterinarians had to make field diagnoses and officials could not wait for laboratory results before moving to slaughter. It was better to risk slaughtering healthy animals than risk the disease spreading. The Ministry also felt that the animals may not have been in the stage of the disease where the virus would show up on the test. Various issues will be investigated in the public inquiry of the FMD epidemic.

Great Britain Refused Offer of Portable FMD Diagnostic Tool

At the beginning of the epidemic, Great Britain was offered the use of a new portable diagnostic tool developed for use by the United States military in case of a biological attack. Diagnosis of biological agents can be confirmed within 24 hours with the kit. At the time of the offer, diagnosis of FMD in the UK was taking up to a week. The Ministry of Agriculture refused use of the diagnostic tool. Questions are now being raised as to why the UK did not accept the offer of the handheld testing equipment for on-the-spot reliable analysis. The British Ministry of Agriculture said it refused the revolutionary method of confirming foot-and-mouth disease within two or three hours, because they did not have the time or the scientists to evaluate it properly.

Medieval Methods of Handling FMD Claimed

Pyres of animal carcasses were criticized for emitting potentially carcinogenic chemicals and being outdated. Dr. Michael Tas, director of disposal operations, told Devon farmers that, "We are still using medieval technology in the 21st century. We have a lot to learn about safely incinerating animals in the

open.” His comments came as the Ministry of Agriculture admitted that nearly a third of the animals slaughtered had later proved negative in tests. The Ministry of Agriculture played down criticisms by one of its own civil servants that it had no contingency plans to deal with a crisis on the scale of the FMD epidemic and used medieval technology to dispose of animal carcasses.

Church of England Prayers Vent Anger at Government

A set of prayers for Church of England clergy this week accused the government of betraying the trust of the countryside during the foot-and-mouth epidemic. There is a “sense of anger and despair” among the farmers in Devon towards the Government and the Ministry of Agriculture.

Prayers compiled by Christian Rural Concern describe the burning of cattle on pyres as “a great holocaust”. Clergy of all Christian denominations normally lead their congregations along footpaths and through fields, blessing the crops and praying for a successful harvest. However, due to the FMD crisis, many rural churches are not able to conduct their usual outdoor services.

Butchers Want Ban on Meat From FMD Countries

The annual conference of the National Federation of Meat and Food Traders, which represents 8,500 independent butchers in England and Wales, is targeting developing countries where foot-and-mouth is endemic and which still export to Britain. Britain imported 152,000 tons of meat from more than 20 non-EU countries last year, with more than 40,000 tons coming from countries where foot-and-mouth disease is widespread. In addition, illegal meat imports are still pouring into Britain.

Ben Gill, the president of the National Farmers' Union, said that controls needed to be tightened in FMD countries such as Brazil, Uruguay and Argentina, which are divided into "foot-and-mouth infected areas" and "foot-and-mouth free areas". Exports are allowed only from "FMD free areas". The big supermarket chains, which import from a number of non-EU countries, opposed the proposed ban and said that all their imported meat met current British standards. Foot-and-mouth countries that export meat to Britain include: Brazil, Namibia, Botswana, South Africa, Swaziland, Paraguay, Thailand and Eritrea. The European Union banned imports from Argentina and Uruguay last month because they had failed to contain FMD within the infected zones.

Brigadier Claims Farmers Infected Animals

Brigadier Alex Birtwistle, who led the army's foot-and-mouth operation in Cumbria, reported farmers had broken transit rules to deliberately infect their stock or hide them from slaughter. Nick Utting, of the National Farmers' Union in Cumbria said: “There has never been evidence of any farmers moving stock in order to get the disease. I know the stress farmers are under when they get the disease. Nobody wants to go through that. They do not get compensation payments, just enough money in order to restock the animals.”

About a dozen farmers are under investigation for the illegal movement of animals. Last month, Cumbria police set up road patrols as a response to anonymous calls accusing farmers of moving stock without a licence. Police said there was no suggestion that anyone was trying to deliberately infect stock.

Gene Bank Developed to Save Rare Sheep

Herdwicks are one of a handful of breeds that survive on the craggy hills of Great Britain. The sheep instinctively stay in one place and winter in the craggy hills. Possessing a territorial instinct passed on from ewe to lamb, they roam free on unfenced common land, surviving on the patchy grass. These sheep have been admired by poets, painters and millions of tourists. The sheep dot patchworks of green fields, slate cottages, stone walls and scree-covered slopes.

The sheep, dark grey or brown with white faces, won the heart of Beatrix Potter, creator of Peter Rabbit. When Potter died in 1943, she left several Lake District farms and their “heft” sheep to the National Trust, a conservation charity whose 90 farms in the region supported 52,000 of Cumbria's 100,000 hefted sheep before the epidemic. FMD has threatened the sheep with slaughter and extinction. Last month, the government loosened the regulations for hefted sheep, allowing farmers to seek an exemption from the slaughter. The National Trust wants the sheep moved to “safe havens” where they can be tested for foot-and-mouth.

Alarmed by the threat to Herdwicks and other rare breeds, scientists took semen and embryos from hundreds of sheep. The samples were stored in liquid nitrogen and form the Heritage GeneBank, an emergency reserve to protect Britain's biodiversity of sheep. Dianna Bowles, a University of York biochemist who leads the project, reported, “Within three to four years there will be the genetic resources to regenerate any sheep breed that's indigenous to the United Kingdom.”

Ecological Terrorism?

Ben Gill, head of the National Farmers' Union of England and Wales, suggested the militant environmentalists or animal rights campaigners may be possible sources of the world's worst recorded foot-and-mouth epidemic. He is concerned about increasingly militant green splinter groups that want to undermine existing agricultural practices.

The green pressure group, Friends of the Earth, accused Mr Gill of making allegations without evidence. The Ministry of Agriculture in London said: "There is no evidence that the outbreak was started deliberately." The Ministry blames farmers and modern farming practices rather than environmentalists for spreading the outbreaks. The fact that thousands of infected sheep were transported, live, round the country, from market to market to get a better price may have caused the mass of cases across Britain.

Mr. Gill reports activists are encouraging the introduction of foot-and- mouth disease into the United States to protest against intensive agriculture. Outbreaks of FMD have been recorded across the world over the past three years, most linked to the Pan-Asian "Type O" strain which has swiftly supplanted weaker strains. In the United States, the FBI is involved with investigating possible eco-terrorist activity.

Trained Veterinarians Needed to Deal With Future Disease Outbreaks

The British Veterinary Association said that existing procedures are not adequate to deal with emergencies on the scale of the current epidemic. A "territorial army of veterinarians" current on animal diseases and technology is needed to react rapidly to such an emergency crisis. Animal disease knowledge has increased, however, the imposition of a raft of red tape has also increased, making surveillance and control harder. The FMD crisis cut some veterinarian's earnings by 90 percent. It is feared that several veterinarians would go out of livestock practice and there might be too few to tackle future epidemics.

Fear FMD Could Linger in Deer Population

Foot and mouth disease could linger unchecked in Britain's burgeoning deer population according to a report this month in the *New Scientist Magazine*. The report indicates the British government seems unconcerned about the possibility that foot-and mouth-disease has spread to wild animals. The Government isn't planning systematic testing of deer for the disease, despite pleas from deer experts.

FMD did not persist in the deer population after Britain's last big outbreak in 1967. But the situation today is different. There has been a tenfold increase in deer numbers, to around two million. The population of wild boar, which can also spread the disease, has grown to unknown proportions since they were accidentally reintroduced to Britain in the 1980s.

The worry is that deer populations are now dense enough for the disease to persist in the wild. All five of Britain's deer species are susceptible to FMD, and infected animals could sporadically reinfect livestock. In Britain, deer hunting was banned in March, for fear that hunters might spread FMD. Since then, a dozen roe deer shot on farmland and four sika from a deer farm in the heavily infected district of Cumbria, have shown clinical signs of FMD, although all tested negative. Hunting restrictions mean deer numbers will rise this summer in those areas.

Infection would be most likely to persist among red, fallow and sika deer, because they form herds, get only mild symptoms and can carry the virus for four months, although they aren't infectious for that long, says Paul Gibbs of the University of Florida at Gainesville.

Unlike Britain, the United States's emergency plans for FMD includes the monitoring of deer. During California's 1924 outbreak, 22,000 mule deer in a national park were killed as a precaution. Of these,

ten percent were found to have symptoms of FMD. The infection died out. "We were very, very lucky," says Juan Lubroth of the United States Department of Agriculture's FMD lab on Plum Island, New York. Some feel that wildlife make poor reservoirs of FMD.

Wildlife Can Harbor Diseases of Domestic Animals

Wildlife can harbor a number of domestic animal diseases, making surveillance in wild animals an important disease control tool. For example, Germany has a problem with swine fever, which is endemic in its wild boar population and occasionally spreads to domestic pigs.

In 1992, the United States Department of Agriculture found that 30 wild pigs on Catalina Island (67% of pigs tested) had antibodies to pseudorabies (Los Angeles County's 1992 Annual Communicable Disease Report). There was concern that hunters bringing wild swine back to the mainland could spread the disease to other animals in Los Angeles County. Since then, surveillance of animal diseases in the County has dropped precipitously. Pseudorabies or Aujeszky's disease has emerged as a significant pathogen in the United States during the past forty years. In California it is a disease reportable to the California Department of Food and Agriculture.

In cattle and sheep, the clinical course is 36-48 hours. The herpesvirus causes a brief excitement phase accompanied by incoordination, convulsions, coma, and death. Clinical signs are similar to those of rabies. In cats and dogs ingestion of infected swine, cattle or rat offal is a common source of infection. Death occurs within three days of onset. Various mammals are susceptible to infection and develop disease. The pig is the only natural host. Immunocompetent people don't develop clinical signs of pseudorabies, but may seroconvert. The alphaherpesvirus might pose a risk for immunocompromised patients. There is no treatment for pseudorabies. Affected animals may die so rapidly that poisoning or some other cause of death may be suspected.

New Outbreak in the Dales

Friday, FMD spread to the Dales National Park, an area popular with tourists. The Conservatives said the fresh outbreak undermined Government claims that the epidemic was under control. A total of 144 cattle and 457 sheep were destroyed. The outbreaks are about ten miles away from previously confirmed cases and they were outside officially designated infected areas. The region is heavily dependent on farming and tourism. The Ministry of Agriculture may cull more animals in the National Park in an attempt to stop the virus spreading farther. Others fear FMD may have spread into susceptible wildlife.

Public Inquiry on FMD Outbreak

Now under debate is who was capable of making the best judgements regarding such animal outbreaks, clinical veterinarians or epidemiologists. People trained in clinical medicine and

epidemiology would be most valuable in such situations. In March, epidemiologists using computer models concluded the epidemic was out of control. Studies, published as two papers in *The Veterinary Record*, concluded the mathematical models used by the Government were over simplistic.

In the May 11 issue of *Science*, epidemiologists reported that hastening the slaughter of animals with suspected infection is predicted to slow the epidemic, but more drastic action, such as "ring" culling or vaccination around infection foci, is necessary for more rapid control.

A leading expert on foot-and-mouth disease has questioned the scientific basis for the huge slaughter program to tackle the crisis in the United Kingdom. Dr Alex Donaldson, head of the Pirbright Laboratory at the Institute for Animal Health, suggests that predictions for the airborne spread of the virus may have been overestimated. Dr Donaldson, who is a member of the government's foot-and-mouth advisory team, published his research findings in the *Veterinary Record*.

Another criticism of officials is the failure to see the big picture. The Government imposed a blanket policy of slaughter, as it did in 1967, despite 33 years of progress in handling such outbreaks. People are asking if the cost of the image (world television pictures of Britain in flames) and the cost of the mass destruction of close to three million livestock was worth it to the British Isles. Tourism brings in billions of dollars, while meat exports bring in only millions of dollars (1/100 of the value of tourism). Prime Minister Tony Blair could have stopped the slaughter, opting for limited vaccination instead - saving billions of dollars and millions of animals.

Little was heard from the Royal Society for the Prevention of Cruelty to Animals and other groups regarding the massive animal slaughter. If a mass culling of animals is started in the United States, animal activists may not sit idly by.

Several issues surrounding the foot-and-mouth disease will be investigated this year.

- ! Coordination of local and national agencies
- ! Use of computer modeling of epidemics
- ! Surveillance and control programs
- ! Role of vaccination programs
- ! Disposal of infected animals